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Work in progress report - Thoracic non-oncologic
Efficacy of SOFT COAG for intraoperative bleeding in thoracic surgery

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Abstract

We present and examine two cases of the dramatic hemostasis with SOFT COAG in general thoracic surgery. SOFT COAG is a coagulation mode unique to VIO electrosurgical units (ERBE Elektromedizin GmbH, Germany). This system regulates the temperature rise below boiling point without generating sparks, which is high enough to denature protein. In addition to clinical applications, this coagulation system makes use of a reusable device, Slim line hand switch®️, which has economically and ecologically major advantages for ecosurgery.

Keywords: Bleeding; Hemostasis; Ecosurgery; SOFT COAG

1. Introduction

We have previously reported the transected pulmonary artery model in beagle dogs to establish the validity of SOFT COAG of a modern electrosurgical unit (VIO300D, ERBE Elektromedizin GmbH, Germany) [1]. The successful results indicated the possibility for further applications. In response to such indication, this report investigates two clinical cases of the dramatic hemostasis with SOFT COAG in general thoracic surgery.

As previously described [1], SOFT COAG is a unique coagulation mode that automatically regulates output voltage below 200 V, causing the generation of Joule heat alone. The heat induces the denaturation of the protein and no tissue carbonization as a result. This method is based on the fact that the protein within the target tissue is effectively coagulated at the temperature between 70 and 80 °C due to the Joule heat generated in the tissue [2]. The bleeding point coagulated by this system showed permanent change of the protein in the microscopic finding, which was maintained even when scratched by a surgical instrument [1].

2. Materials and methods

Two patients who underwent thoracic surgical interventions were chosen. One was a 32-year-old woman who took a posterior mediastinal tumor resection and the other was a 62-year-old woman who had a squamous cell carcinoma of the lung. These patients were selected as they were to take different surgical procedures; open and thoracoscopic. Investigating two different surgical interventions indicates how clinically applicable the method is. The study was approved by the Institutional Review Board of Saga Prefectural Hospital Koseikan and the enrolled patients signed a full informed consent.

2.1. Technique of the hemostasis

After the temporary control of the bleeding by the finger or surgical instruments, a ball electrode with tip diameter of 4 mm (Slimline hand switch®️) (Fig. 1), connected to VIO300D was placed against the bleeding point. SOFT COAG was set at Effect 6 and 80 W (our own upper limit setting). VIO’s effect setting represents the setting of power voltage. Effect 6 is 156 V.

3. Results

3.1. Case 1

A 32-year-old woman underwent thoracoscopic posterior mediastinal tumor resection (neurogenic tumor). During the dissection of the cranial side of the tumor, an intercostal vessel was injured and caused active bleeding. After the temporary control of the bleeding, a ball electrode was placed against the bleeding point. The bleeding gradually subsided and finally was well controlled by the technique (Video 1).

3.2. Case 2

A 62-year-old woman was suffering from the squamous cell carcinoma of the lung, which completely occluded the
right upper bronchus. She underwent a sleeve upper lobectomy of the right lung. During the dissection of the tumor along the intermedial trunk of the right bronchus, traction of the taped pulmonary artery (A6, already untapped in this video) made a small tear in the artery. After temporary control of the bleeding, the electrode was placed against the carefully searched bleeding point. The bleeding was easily controlled (Video 2).

4. Discussion

The purpose of this study was to investigate the clinical efficacy of SOFT COAG, which was proven valid in a previous animal study. Once we understood the hemostatic ability of SOFT COAG in the animal experiment, the methods were applied to clinical cases. The demonstrated methods were to control the active bleeding from the intercostal vessel and pulmonary artery during the surgical procedures.

Bleeding during thoracoscopic procedures could necessitate conversion to thoracotomy in order to control it. In our case 1, SOFT COAG made it possible to avoid an open procedure to stop such active bleeding. The hemostatic ability and its utility are also highlighted in case 2, which is an open procedure. If SOFT COAG was not available, we would have probably needed to suture the bleeding point, which would have taken much more time than the treating time with SOFT COAG. Easy control of bleeding contributes to avoiding time-consuming procedures in such a bleeding situation. In addition, the protein denaturation controls the bleeding permanently, which is not possible by the conventional electrosurgical units forming a carbonized eschar.

In addition to such clinical applications, the device used with a VIO unit, Slimline hand switch (Fig. 1) has a major economical advantage for the daily clinical practice; it is reusable for ~100 times by autoclave sterilization. Now there is even a term ‘Ecosurgery’, which respects the economical and ecological aspects. Sitges-Serra [3] insists on refraining from the use of single-use devices. With less industrial wastes of plastic materials, reusable devices contribute to economy and ecology.

References

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